EASTHAMPTON Public Schools
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Science
High School Chemistry

	What students will know and be able to do:	Standard
Properties of Matter	• Distinguish between chemical and physical properties or between chemical and physical changes. • Identify pure substances (elements and compounds) and (heterogeneous or homogeneous) mixtures. • Explain the difference in particle motion between the three states of matter and the phase transitions involved.	1.1, 1.2, 1.3
Atomic Structure	• Describe how Dalton's Atomic Theory has evolved into the Modern Atomic Theory through experimental discovery. • Know subatomic particles of an atom, distinguish between an isotope and an ion, and determine the number of subatomic particles when given partial information on an isotope. • Write nuclear symbols (for alpha particles, beta particles, positrons, neutrons, and gamma radiation) and balance nuclear reactions. • Determine how much radioactive material remains or calculate the length of time for a prescribed amount of a sample to decay. Distinguish between fission & fusion. • Students can use dimensional analysis to convert from grams to moles to atoms and vice versa. • Write the electron configurations for the first twenty elements and determine number of valence electrons and identify trends within each group.	2.1, 2.2, 2.3 2.2 2.5 2.6 & 2.7 5.3 3.1, 3.2, 3.3, 2.4
Chemical Compounds	• Conceptualize through the use of Lewis Dot diagrams the formation of ionic and covalent bonds. • Identify the shapes of CO_2, CH_4, BCl_3, and H_2O using the VSEPR theory. • Write the chemical formula for potassium hydroxide, carbon tetrachloride, silicon dioxide, lead(IV) sulfate, and lead(II) iodate. • Determine the percent ionic and covalent character between Ca-Cl, Al-Si, C-H, and Ba-O given a table of electronegativities. Use polar and non-polar properties to invoke separations through chromatography.	4.1, 4.2 4.4 4.6 4.3, 4.5, 3.4

Chemical Reactions	• Write the balanced equation that shows the reaction of aluminum carbide with water to produce methane gas and aluminum hydroxide. • Determine the products of a synthesis, decomposition, single displacement, double displacement, and neutralization reactions. • Determine the amount of sodium azide that is required to fill a 20 L air bag at 2 atm with a temp. of 25 ^{o}C. • Find the percent compositions of the elements in sucrose, $C_{12}H_{22}O_{11}$. • Describe how the reaction rate is affected by changes in temperature, concentration, particle size, and surface area. Explain how mixing and the introduction of a catalyst changes the rate. • Apply LeChatelier's principle to explain shifts in equilibrium when a stress is applied to a system (changes in concentration, pressure, volume, and temperature). • Recognize an oxidation/reduction reaction and balance these reactions.	4.6, 5.1 5.2 5.5, 5.3, 5.6, 6.2 5.4 7.5 7.6 8.4
Acids & Bases	• Can identify conjugate acid-base pairs by examining a chemical reaction and applying the Arrhenius or Bronsted-Lowry definition. • Test materials using an appropriate indicator, pH paper, or pH meter to determine acidity, basicity, or neutrality. • Recognize that a weak acid (or base) and a salt of the weak acid (or base) resists changes in pH.	8.1 8.2 8.3
Kinetic Molecular Theory & Thermochemistry	• Solve qualitative and quantitative problems for Boyle's Law, Guy Lussac's Law, Charles's Law, Avogadros Law and the Combined Gas Law. • Utilize the combined gas law and reaction stoichiometry to find amount of gas generated in a reaction or the amount of reactant needed. • Explain particle motion using kinetic molecular theory for gases, liquids, and solids. Describe what happens at the molecular level when a gas undergoes a phase transition. • Differentiate between an exothermic and endothermic reaction and what is occurring at the molecular level. • Describe why systems naturally tend to move in a direction of disorder (increase in entropy).	6.1 6.2, 5.5 6.3 6.4 6.5
Solutions	• Prepare a solution of the correct concentration. • Contrast colligative properties such as boiling point and freezing point on solutions and pure solvents.	7.1, 7.2, 7.3 7.4